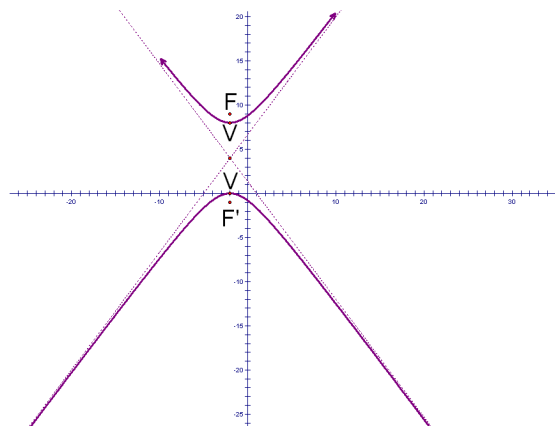


8.5 Hyperbolas

Hyperbola--the set of all points such that the absolute value of the difference of the distances from a point to two fixed points (foci) is a constant



gsp

Visual of construction

Focal radii--distances from the foci to a point P on the curve

Opens left/right

$$\frac{(x-h)^2}{a^2} - \frac{(y-k)^2}{b^2} = 1$$

Opens up/down

$$\frac{(y-k)^2}{a^2} - \frac{(x-h)^2}{b^2} = 1$$

a is not necessarily the largest, but first.

a = distance from center to vertex

b =

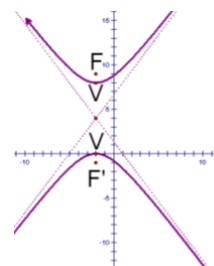
c = distance from center to each focus

Transverse axis--line segment of length $2a$ that intersects the hyperbola in 2 points (vertices)

Conjugate axis--perpendicular to transverse axis and has a length of $2b$

$$a^2 + b^2 = c^2$$

asymptote--line such that the distance between this line and a point, P, on the graph goes to 0 as the distance between P and the center becomes greater and greater.



Equations of asymptotes

With a center of $(0, 0)$.

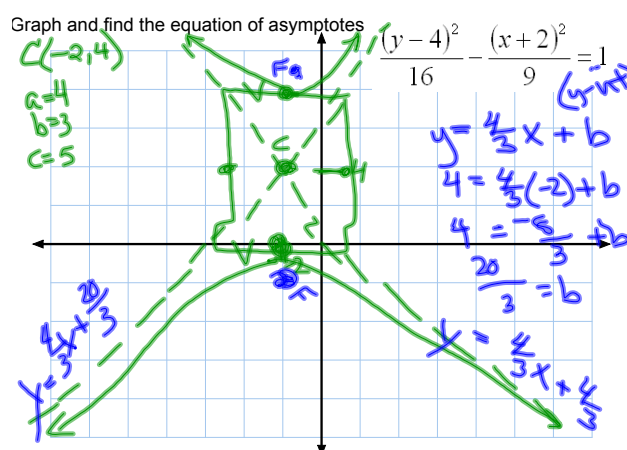
Left/Right

Up/Down

$$y = \frac{b}{a}x \quad y = -\frac{b}{a}x \quad \left| \quad y = \frac{a}{b}x \quad y = -\frac{a}{b}x$$

With a center of (h, k) , the y-intercept is not zero, so you must figure it out.

Graph and find the equation of asymptotes

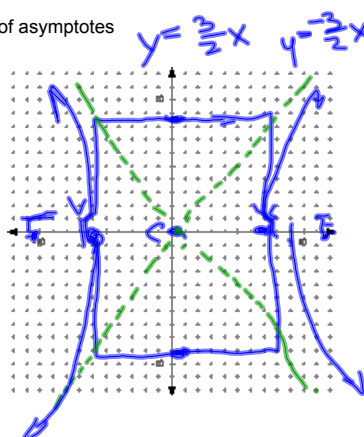


Graph and find the equation of asymptotes

$$\frac{x^2}{36} - \frac{y^2}{81} = 1$$

C(0,0)

$$\begin{aligned} a &= 6 \\ b &= 9 \\ c &= 3\sqrt{13} \end{aligned}$$



Write the equation of a hyperbola with C(0, 0).
Horizontal transverse axis, a = 8, b = 5

$$\frac{x^2}{64} - \frac{y^2}{25} = 1$$

Write the equation of a hyperbola with F(10, 0)
and F(-10, 0). 2a = 16

$$\begin{aligned} C(0,0) \quad a &= 8 \quad 8^2 + b^2 = 10^2 \\ c &= 10 \quad b^2 = 36 \end{aligned}$$

$$\frac{x^2}{64} - \frac{y^2}{36} = 1$$

Write the equation of a hyperbola with V(1, -2)
and V(1, 2). b = 2

HW
p445-446
11-19odd, 23, 31,33

Attachments

hyperbola_trans_sketch.gsp